Defining Network Handoff and Why It Matters.

Presentation for FCC Public Safety and Homeland Security Bureau

Layer 2 Connections, LLC

June 29, 2011

Objectives and Agenda

Agenda

- First Responder Needs, VWAN Refresh
- Observations
- Open Discussion

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First Responder Technical Challenges

- Insufficient and unreliable mobile bandwidth for video/VoIP.
  - Low bandwidth situations – need to boost bandwidth to support critical applications
  - Regular bandwidth situations – need resilience for out of coverage challenges
  - Congestion situations – need ability to just get through

- Security of paramount concern.

- Quality of Experience is a challenge.

- High cost of reliable and adequate wired and wireless bandwidth.

- Need for "always on" connectivity.

- National Broadband Plan driving requirements for Nationwide Interoperability for first responders.

FCC recommendations

"Unfortunately, America will inevitably face not just day-to-day public safety needs but the needs caused by occasional major disasters, and accordingly the public safety network must be able to expand its capacity to deal with extreme circumstances.

For that reason, **the FCC recommended that public safety be able to roam over to commercial networks** *with priority access to provide as much as 60 additional megahertz of spectrum. This concept has the additional advantage of providing two or more back-up networks, and therefore much more resiliency and redundancy than we currently have."*

SOURCE: CHIEF JAMES BARNETT STATEMENT TO SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION ON 9.23.10

# Current PSCR requirements

700 MHz Seamless Roaming Requirements

Title: Interop 4 - Inter-RAT

- **Requirement:** PSCR Requirement
- **Configuration:** Basic configuration + Requires multi-mode UEs, and access to non-LTE network
- **Purpose:** To demonstrate a UE can roam from/to a non-LTE network to an LTE network.

SOURCE: Public Safety Communications Research, NIST Aug 23, 2010

VWAN Demonstration
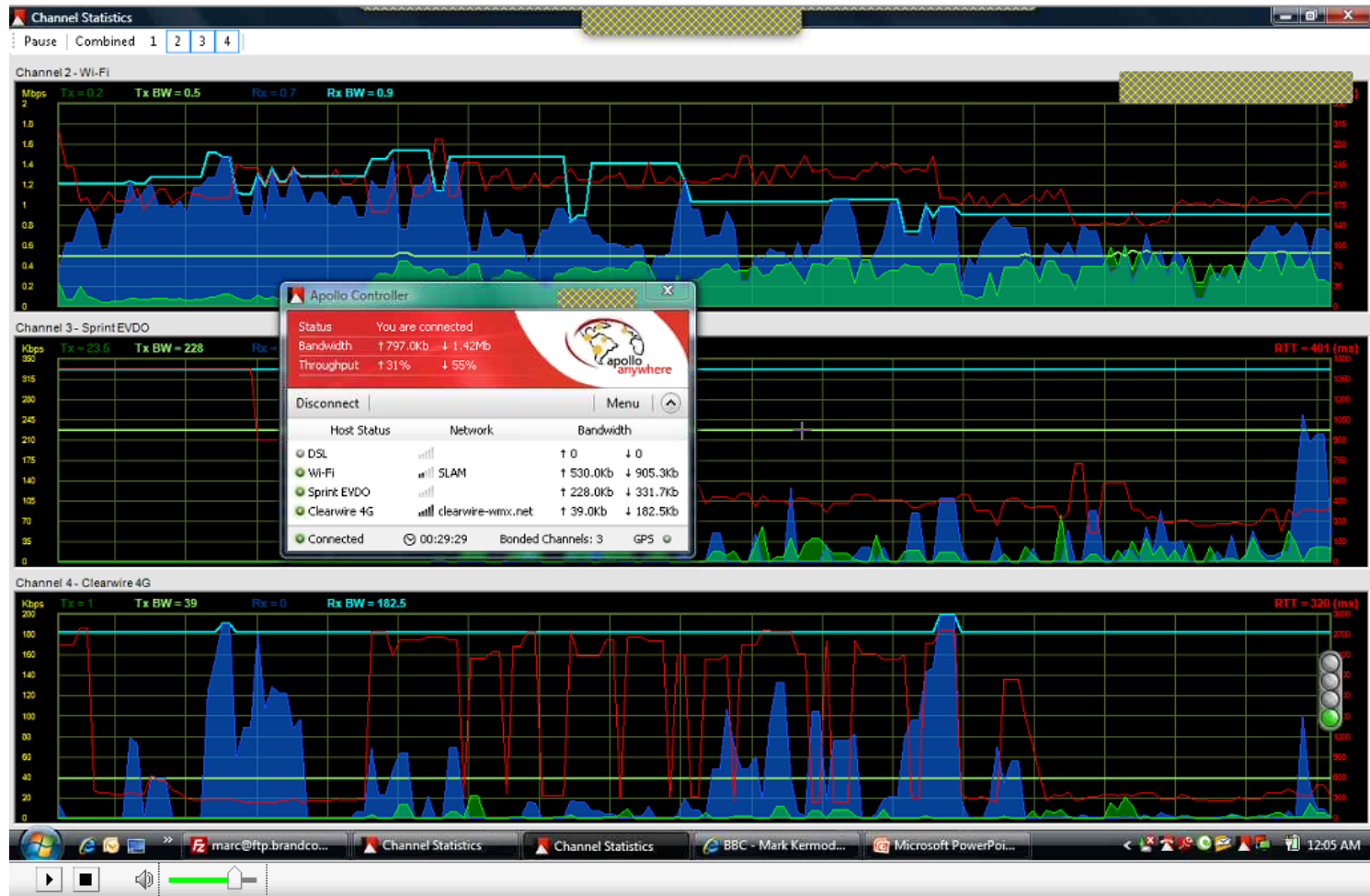
Screen Scrape of VWAN solution in Bonded Mode splitting traffic simultaneously across 3 dissimilar wireless connections (WiFi, 3G, 4G).

Summary of Prior Session

- Efforts to provide first responders with improved broadband will benefit from recognizing there is often sufficient broadband available but insufficient *access* to it.

- Virtual Wide Area Networks (VWANs) make multiple similar and/or dissimilar WAN networks act and behave as one.

- VWANs can improve the safety and productivity of first responders by:
  – Offering resilience in connection, enabling "make-before-break" seamless handoff of a data session across similar and/or dissimilar networks;
  – Aggregating the bandwidth of multiple connections to improve situational awareness, and;
  – Enabling interoperability across multiple jurisdictions.

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Our Focus Topics

1. The transition from commercial and private networks used by public safety agencies today to the emerging 700 MHz Public Safety network(s).

2. How both the *definition* of seamless network handoff – for both Intra-RAT (Radio Access Technology) and Inter-RAT handoff – and the *timing* of these requirements are important to first responders.

Our Focus Topics

1. The transition from commercial and private networks used by public safety agencies today to the emerging 700 MHz Public Safety network(s).

Observation: This transition is important and not addressed explicitly. The network of networks approach should be expanded to include existing networks used by agencies today.

Our Focus Topics

2. How both the *definition* of seamless network handoff – for both Intra-RAT (Radio Access Technology) and Inter-RAT handoff – and the *timing* of these requirements are important to first responders.

Observations:

- Stirs debate.

- Our position:
  -- "Make-before-break" handoff is needed to maintain situational awareness and communications for the first responder.

  -- No more important time than now for Inter-RAT seamless handoff given the transition.

- Opportunity to address the true end-to-end requirements of responders with this definition.
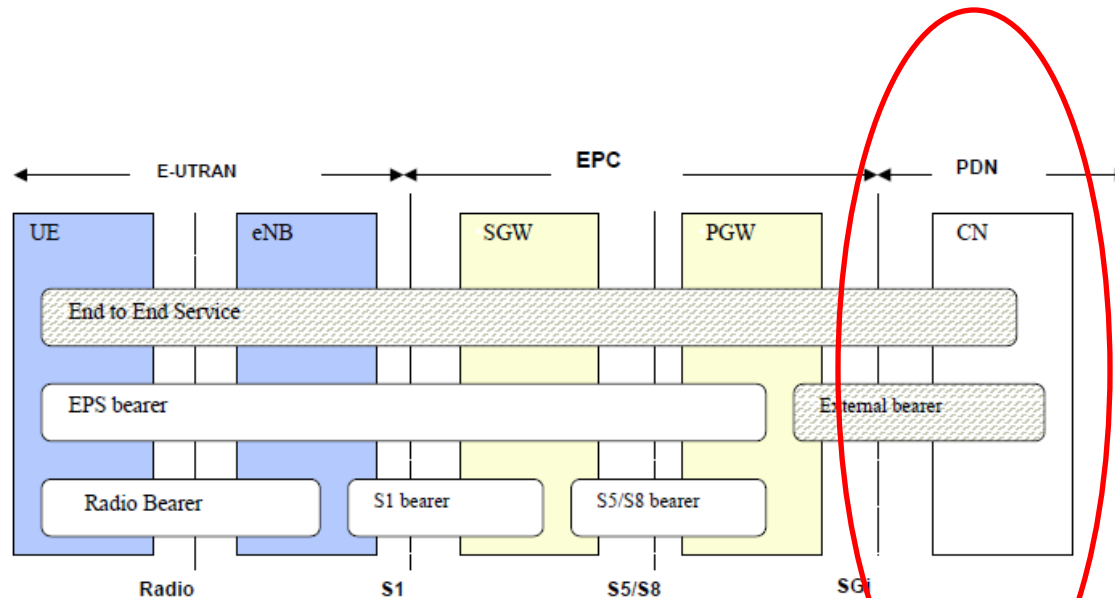
LTE End-to-End Requirements

- Requirement: LTE must provide applications an end-to-end service with unbroken QoS

SOURCE OF DIAGRAM: Q0S FOR LTE PRESENTATION BY ALCATEL LUCENT AT PSCR, DEC 2010
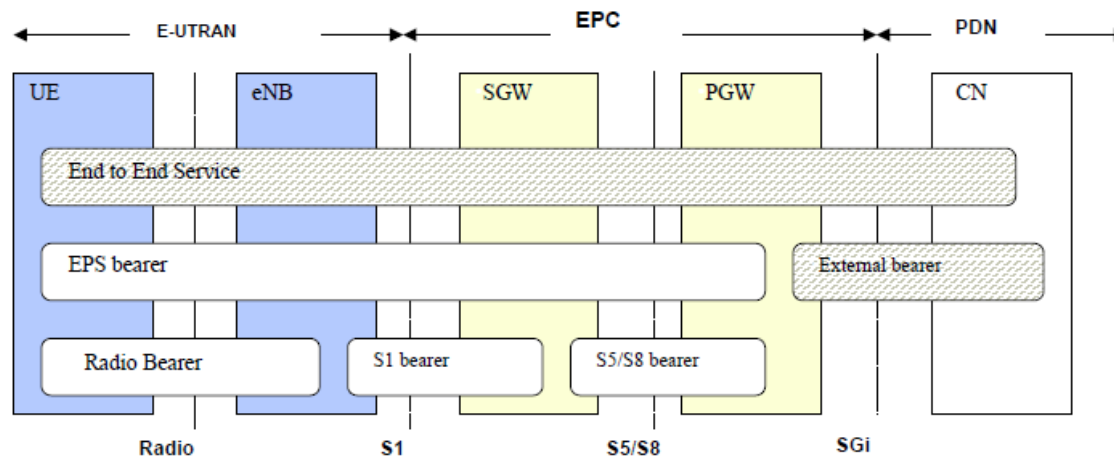
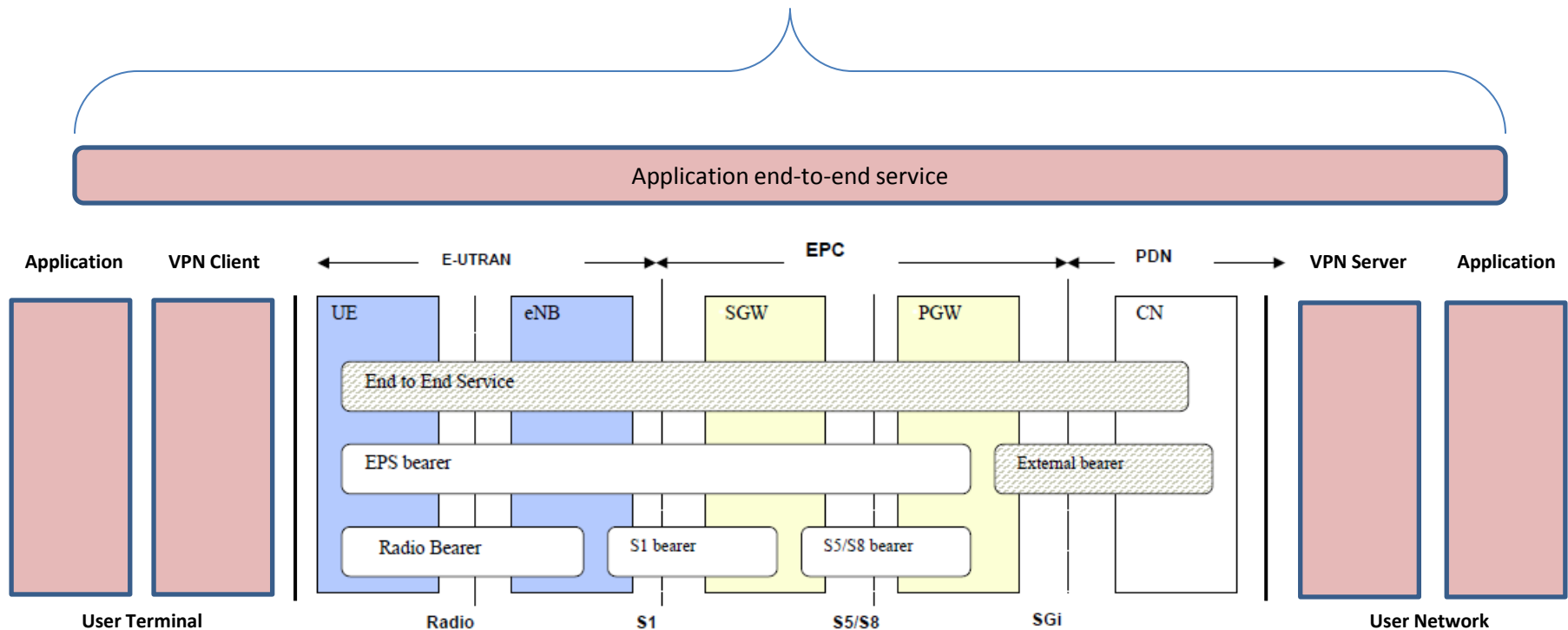# LTE End-to-End Requirements

- Requirement: LTE must provide applications an end-to-end service with unbroken QoS
- Challenge: LTE has to interconnect with packet data networks in multiple security domains
- Challenge: LTE security extends to the PGW which is likely not the application end point
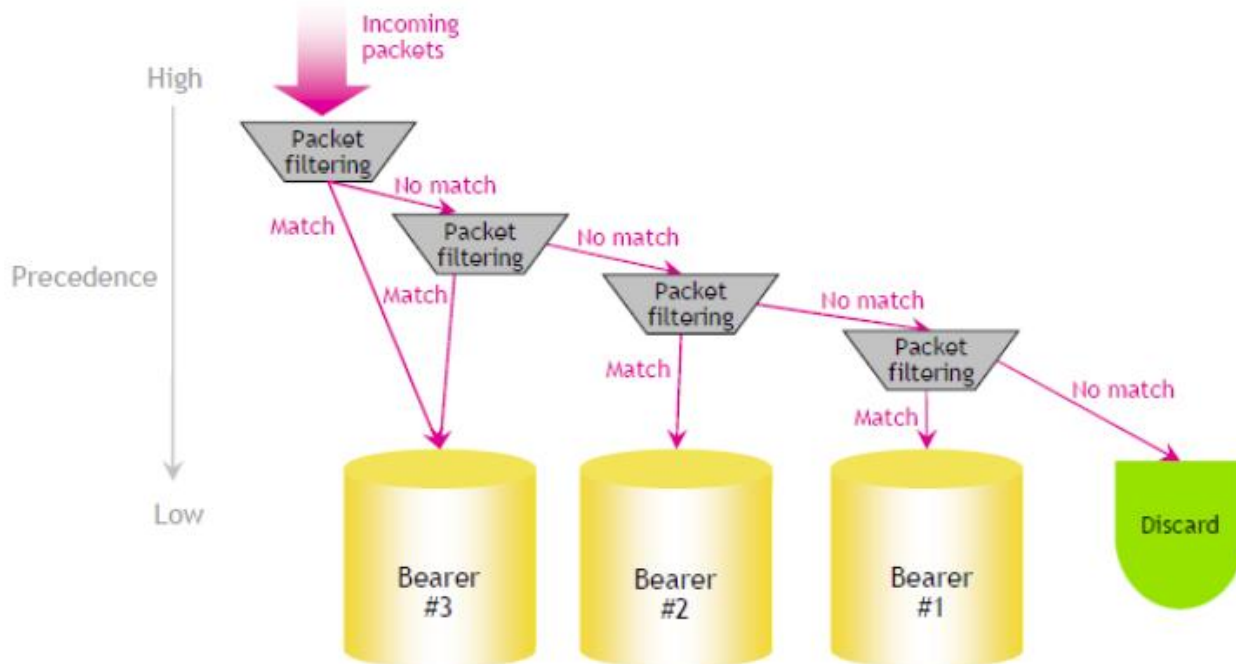

NOTES ON BUILD OF DIAGRAM AND COMMENTARY: THESE ARE SOLELY THE OPINIONS OF LAYER 2 CONNECTIONS.

Application End-to-End Requirements

- Requirement: Applications need a true end-to-end service with unbroken QoS

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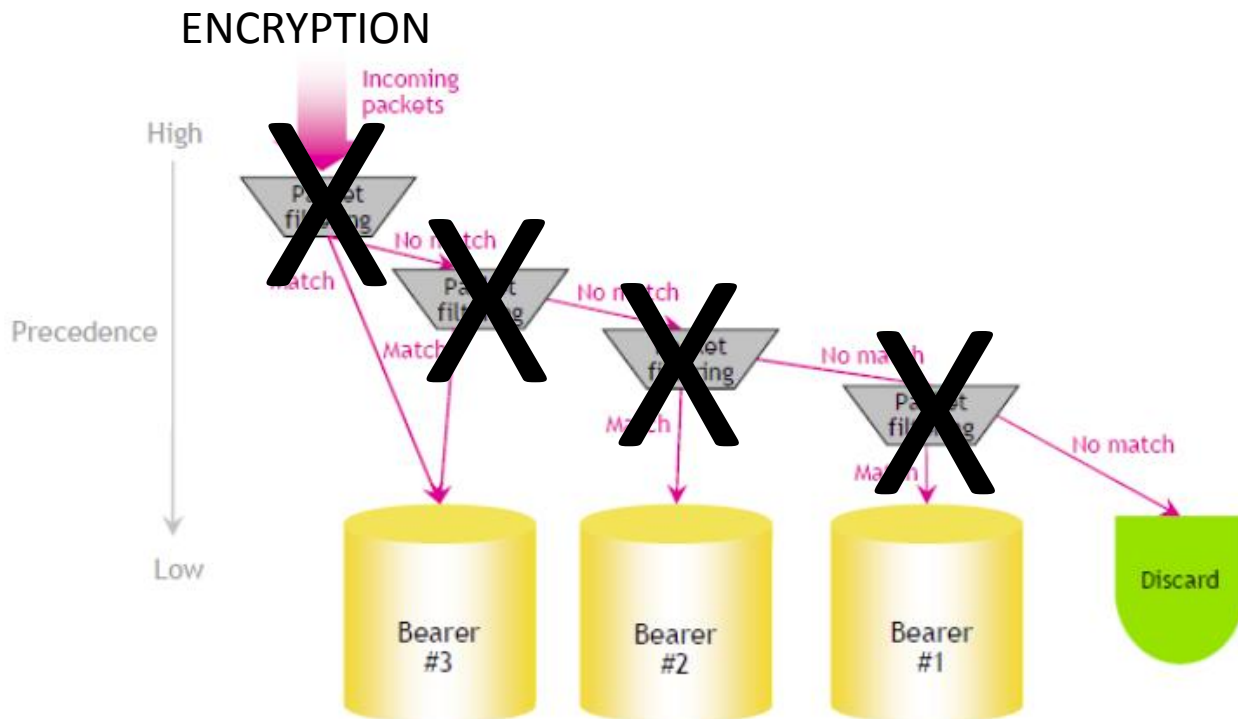
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Application End-to-End Requirements

- Requirement: Applications need a true end-to-end service with unbroken QoS
- Challenge: End to end encrypted VPNs will obscure packet identifiers
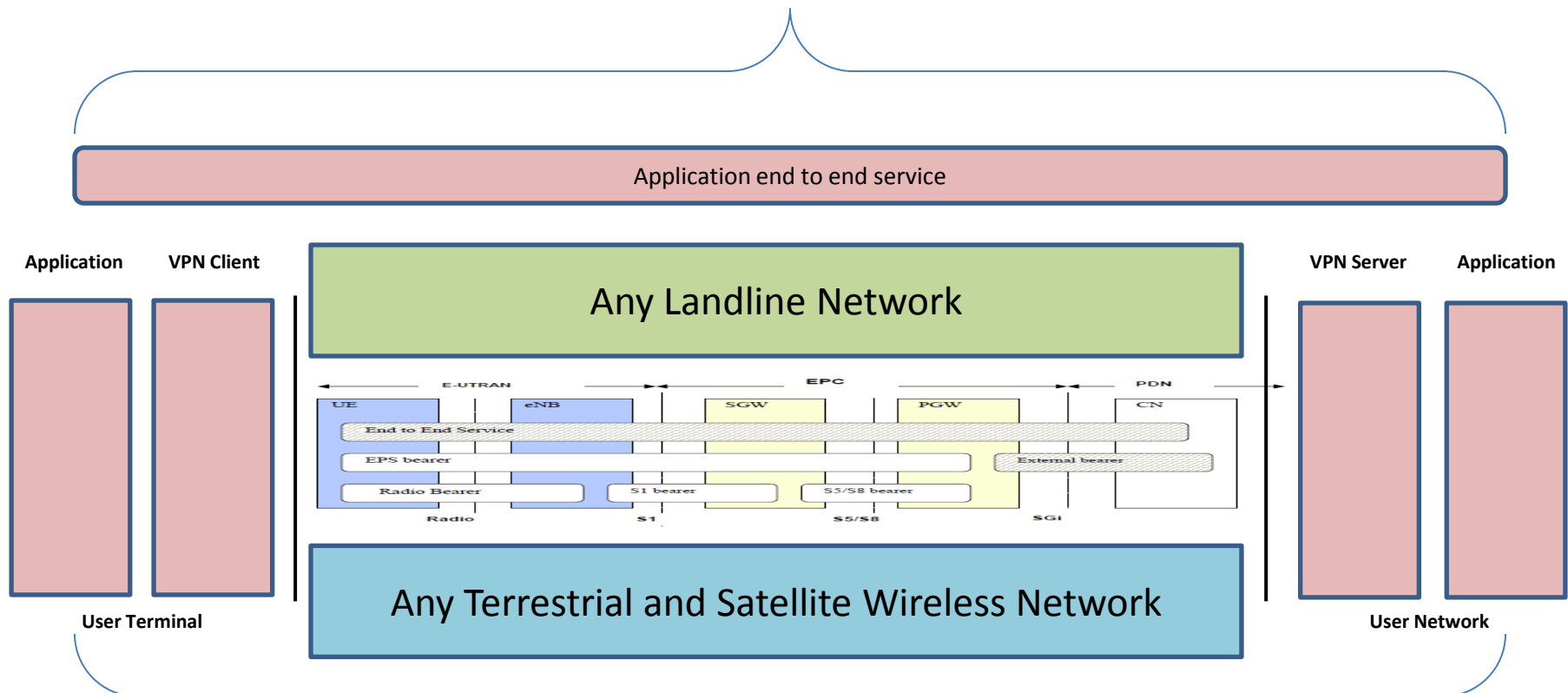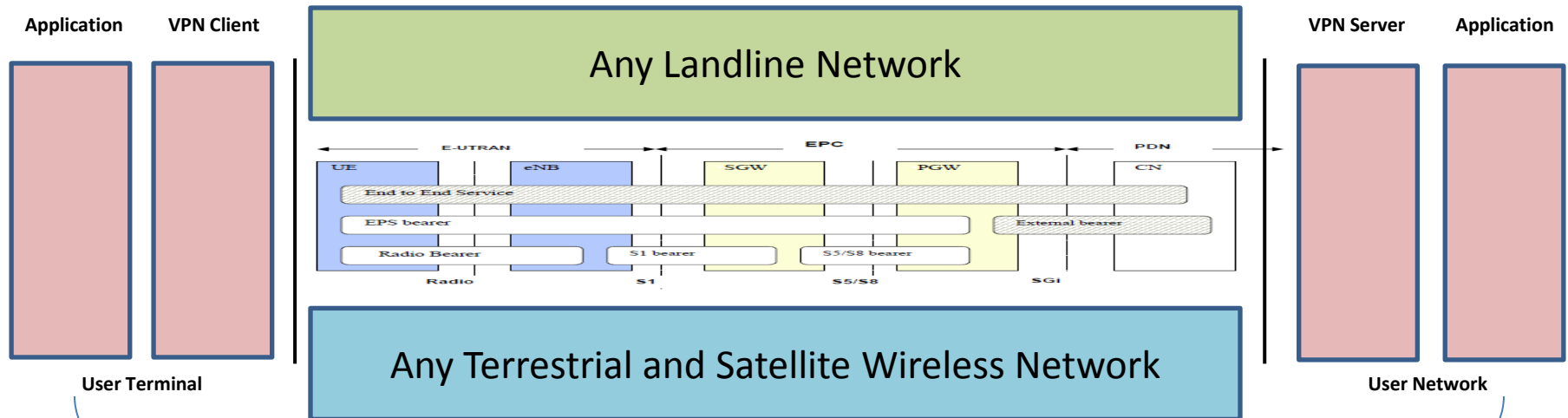- Challenge: This renders packet examination and QoS ineffective

ENCRYPTION

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Application End-to-End Requirements

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- Requirement: Applications must be able to move seamlessly between networks

- Requirement: Applications must be able to use multiple networks simultaneously

Application end –to-end service

| Application | VPN Client | Any Landline Network | VPN Server | Application |

User Terminal

User Network

Any Terrestrial and Satellite Wireless Network

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Recommendations

- Mandating "make-before-break" seamless transition will improve the situational awareness and safety of the responder.

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- Inter-RAT (radio-access-technology) handoff between dissimilar networks can be handled via mobile VPN – and actually needs to be handled outside the LTE network in order to maintain security.

Recommendations

- Mandating "make-before-break" seamless transition will improve the situational awareness and safety of the responder

- Inter-RAT (radio-access-technology) handoff between dissimilar networks can be handled via mobile VPN – and actually needs to be handled outside the LTE network in order to maintain security.

- Supporting Inter-RAT handoff now enables transition to the 700 MHz Public Safety Broadband Network (PSBN) and resilience for the PSBN in times of outage and/or congestion.

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